



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,605	06/23/2003	Gervase Maxwell Christie	D-21357	9584

27182 7590 09/20/2005

PRAXAIR, INC.
LAW DEPARTMENT - M1 557
39 OLD RIDGEBURY ROAD
DANBURY, CT 06810-5113

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 09/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/600,605

Applicant(s)

CHRISTIE ET AL.

Examiner

Raymond Alejandro

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>06/23/05</u> | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1745

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 06/23/03 was considered by the examiner.

Drawings

2. The drawings were received on 06/23/03. These drawings are acceptable.

Specification

3. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 1745

6. The language "*a sufficient amount of hydrogen*" and "*is at least sufficient to*" in claims 1 and 7 is a relative term which renders the claim indefinite. The aforementioned language is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. *In this instance, it is uncertain as to what specific amount of hydrogen the claims are intended to recite.*

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-5 and 7-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Shabana et al 2004/0018632.

The present claims are directed to a hydrogen storage system wherein the disclosed inventive concept comprises the specific main and auxiliary hydrogen storage system.

As to claims 1 and 7:

Shabana et al disclose a hydrogen processing unit for a cell storage systems (TITLE) wherein the hydrogen processing unit is provided for attachment between a fuel cell stack (or stacks) and a hydrogen storage media (a plurality of hydrogen storage media) (ABSTRACT).

The hydrogen storage includes a hydrogen pressure regulator and other ancillary equipment to enable selective attachment of hydrogen storage media in different forms including compressed gas (ABSTRACT). The fuel cell is a polymer electrolyte/proton exchange membrane fuel cell (SECTION 0014)

Shabana et al depict in **FIGURE 2** below a fuel cell system including three compressed gas hydrogen storage tanks 112, 114, 116 connected to a common manifold 118 for delivery to a hydrogen processing unit 130 for delivering hydrogen at the desired pressure, temperature, humidity and purity to the fuel cell stacks 120 (SECTION 0025). *Thus, Shabana et al at once envisage a flow control network to control the hydrogen flow distribution.*

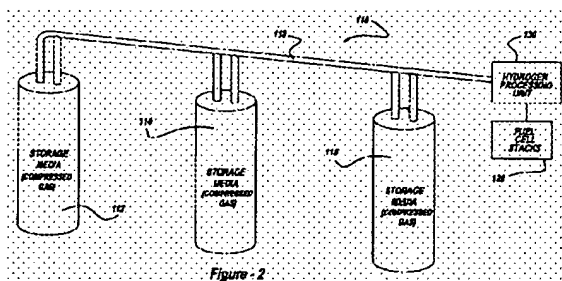
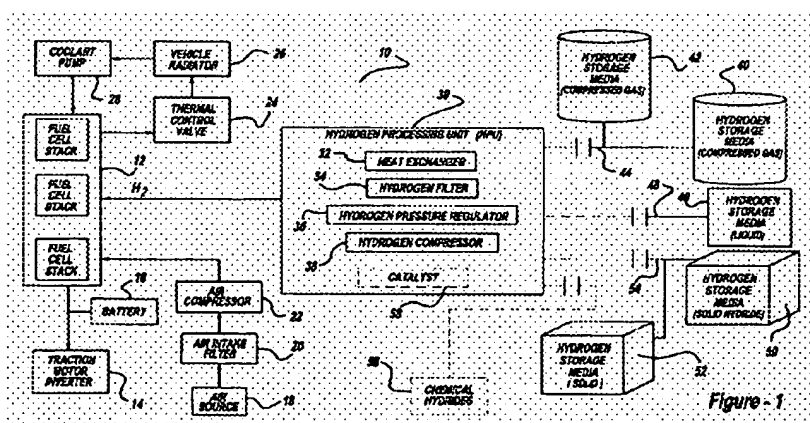


Figure 1 below also illustrate the fuel cell system incorporating a hydrogen processing unit which is selectively connectable to a variety of different hydrogen storage media 40, 42, 46, 50 and 52 and to a hydrogen pressure regulator 36 (*←emphasis added*) (SECTION 0012).



Art Unit: 1745

1st Examiner's note: the limitations "a sufficient amount" or "sufficient to" do not distinguish over prior art because the recitation that an element/feature/member is "sufficient to" or "is provided in a sufficient amount" is not a positive limitation but only requires the ability to so perform.

2nd Examiner's note: the specific preamble reciting "for supplying hydrogen to a fuel cell employing a polymer membrane and to power a load in accordance with a predetermined electrical power requirement and to maintaining the polymer membrane in a hydrated preamble refers to intended use. That is, the claim is directed to "a hydrogen storage system" per se and the aforementioned preamble phrase is only a statement of ultimate intended utility.

With respect to claims 2 and 8:

The use of a pressure regulator/throttle valve is taught (SECTION 0006, 0018).

Concerning claim 3:

As illustrated in **Figure 2** above, the hydrogen processing unit of Shabana et al includes 3 storage media for compressed hydrogen gas (See FIGURE 2). In addition to that, as evident from **Figure 1** above, the fuel cell system 10 includes a variety of different hydrogen storage media 40, 42, 46, 50 and 52 (See Figure 1); and Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). *Therefore, Shabana et al envisions that hydrogen storage media 46, 50 and 52 can be replaced by compressed hydrogen gas tanks, accordingly, Shabana et al at once envisage the use of 5 compressed hydrogen gas*

Art Unit: 1745

tanks as the hydrogen storage media which are either connected to the common manifold or connected to uncommon manifolds.

In reference to claims 4-5 and 8:

Shabana et al depict in **FIGURE 2** below a fuel cell system including three compressed gas hydrogen storage tanks 112, 114, 116 connected to a common manifold 118 for delivery to a hydrogen processing unit 130 for delivering hydrogen at the desired pressure, temperature, humidity and purity to the fuel cell stacks 120 (SECTION 0025). *Thus, Shabana et al at once envisage a flow control network to control the hydrogen flow distribution.*

In addition, Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). Shabana et al disclose the hydrogen pressure regulator drops the pressure to a predetermined a desired stack pressure when the hydrogen storage media is compressed gas (SECTION 0018), and/or liquid hydrogen (SECTION 0019), and/or hydrogen in solid form (SECTION 0020). *Therefore, Shabana et al envisions that hydrogen storage media 46, 50 and 52 can be replaced by compressed hydrogen gas tanks, accordingly, Shabana et al at once envisage the use of 5 compressed hydrogen gas tanks as the hydrogen storage media which are either connected to the common manifold or connected to uncommon manifolds. Hence, Shabana et al discloses the pressure harmonization of each hydrogen storage media (gas, liquid or solid) when they are combined together.*

As for claims 9-10:

Art Unit: 1745

Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). *Thus, periodical removal and replacement of the hydrogen storage media is contemplated.*

Thus, the claims are anticipated.

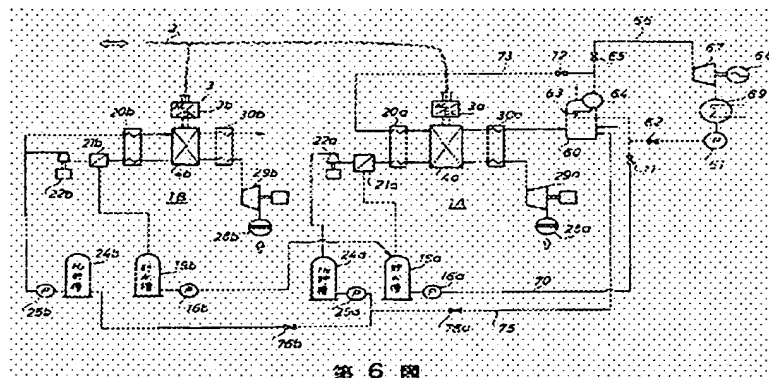
9. Claim 1-2 and 7-8 are (at least) rejected under 35 U.S.C. 102(b) as being anticipated by the Japanese publication JP 04-115470 (herein called "*the JP '470 publication*").

As to claims 1 and 7:

The JP'470 publication discloses a fuel cell power generator comprising hydrogen storage tanks and a common manifold 10 to distribute hydrogen therefrom (ABSTRACT).

Figure 6 below illustrates the fuel cell comprising the hydrogen distribution system including tanks 24a and 24b (*that is, two different hydrogen storage sites, ←emphasis added*); valves 76a, 76b and pressure regulator/indicator 25a, 25b. The JP'470 publication mentions that hydrogen is fed to the storage tank through the manifold 10, and thereafter, said hydrogen is re-introduced into the fuel cell (ABSTRACT). *Thus, hydrogen is periodically renewed so that sufficient hydrogen is available for operation of fuel cells.*

Art Unit: 1745



The JP'470 publication teaches that the system is effectively operated so that efficient performance thereof is achieved (ABSTRACT). *Additionally, given that the system comprises valves and pressure regulator/indicator, it can be established that it has a flow control network allowing distribution of hydrogen gas therethrough.*

1st Examiner's note: *the limitations "a sufficient amount" or "sufficient to" do not distinguish over prior art because the recitation that an element/feature/member is "sufficient to" or "is provided in a sufficient amount" is not a positive limitation but only requires the ability to so perform.*

2nd Examiner's note: *the specific preamble reciting "for supplying hydrogen to a fuel cell employing a polymer membrane and to power a load in accordance with a predetermined electrical power requirement and to maintaining the polymer membrane in a hydrated preamble refers to intended use. That is, the claim is directed to "a hydrogen storage system" per se and the aforementioned preamble phrase is only a statement of ultimate intended utility.*

As to claims 2 and 8:

Figure 6 above illustrates the fuel cell comprising the hydrogen distribution system including tanks 24a and 24b; valves 76a, 76b and pressure regulator/indicator 25a, 25b

Consequently, the claims are anticipated.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shabana et al 2004/0018632 as applied to claim 2 above, and further in view of McAlister 6756140.

Shabana et al is applied, argued and incorporated herein for the reasons above. Nevertheless, the preceding prior art reference does not expressly disclose the specific carbon-fiber wrapped hydrogen cylinder/tank.

McAlister discloses energy conversion devices (TITLE) using a fiber reinforced composite cylindrical tank with walls comprising densely wrapped carbon fiber (COL 9, line 55-65 and COL 10, line 14-18).

Art Unit: 1745

In view of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to use the specific carbon-fiber wrapped hydrogen cylinder/tank of McAlister in the hydrogen processing unit of Shabana et al as McAlister teaches that such specific cylinder tank is capable of effectively sustaining high pressures as required for storing hydrogen as well as it is useful in mobile applications.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Primary Examiner
Art Unit 1745


RAYMOND ALEJANDRO
PRIMARY EXAMINER